Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Coherent Atom Beams to Probe Surface Dynamics FOREST PATTON, STEPHEN KEVAN, University of Oregon — We are developing a probe of surface dynamics for time scales and size scales on the order of 1ms and 1 nm respectively. This is done by quasielastic scattering of a coherent thermal atom beam off a surface. Helium atoms and hydrogen molecules have de Broglie wavelengths of about 1 angstrom making them natural choices for nanoscale probes. Scattered coherent atoms interfere with themselves to create a speckle pattern. As in dynamic light scattering, monitoring the change in the reflected speckle pattern will probe the time scales of surface dynamical processes. We have created a continuous coherent beam of atoms. We have measured diffraction from single slits, pinholes, and sets of randomly oriented pinholes (to simulate a speckle pattern). We are at the stage where we are trying to reflect the beam off of a sample. The set up includes using a high voltage ionization tip and channel electron multiplier as detector, a micron sized glass capillary nozzle with 1000 PSI stagnation pressure, and micron sized skimmers and pinholes to create the conditions for coherence.

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Date submitted: 23 Nov 2004 Electronic form version 1.4